# Hilti HIT-HY 200 post-installed rebars

| Injection mortar system | | Benefits |
|---|---|---|
|  | Hilti HIT-HY 200-R 330 ml foil pack (also available as 500 ml foil pack)<br>Hilti HIT-HY 200-A 330 ml foil pack (also available as 500 ml foil pack)<br>Static mixer<br>Rebar | - HY 200-R version is formulated for best handling and cure time specifically for rebar applications<br>- Suitable for concrete C 12/15 to C 50/60<br>- Suitable for dry and water saturated concrete<br>- For rebar diameters up to 32 mm<br>- Non corrosive to rebar elements<br>- Good load capacity at elevated temperatures<br>- Suitable for embedment length up to 1000 mm<br>- Suitable for applications down to -10 ℃<br>- Two mortar (A and R) versions available with different curing times and same performance |


Concrete


Fire resistance


European Technical Approval

Corrosion tested

PROFIS Rebar design software

## Service temperature range

Temperature range: -40℃ to +80℃ (max. long term t emperature +50℃, max. short term temperature +80℃) .

## Approvals / certificates

| Description | Authority / Laboratory | No. / date of issue |
|---|---|---|
| European technical approval [a)] | DIBt, Berlin | ETA-12/0083 / 2012-08-08 (HIT-HY 200-R)<br>ETA-11/0492 / 2012-08-08 (HIT-HY 200-A) |
| Fire test report | CSTB, Paris | 26033756 |

a) All data given in this section according ETA-12/0083, issued 2012-08-08 and ETA-11/0492, issued 2012-08-08.

## Materials

Reinforcement bars according to EC2 Annex C Table C.1 and C.2N.

**Properties of reinforcement**

| **Product form** | | **Bars and de-coiled rods** | |
|---|---|---|---|
| Class | | B | C |
| Characteristic yield strength $f_{yk}$ or $f_{0,2k}$ (MPa) | | 400 to 600 | |
| Minimum value of $k = (f_t/f_y)_k$ | | ≥ 1,08 | ≥ 1,15<br>< 1,35 |
| Characteristic strain at maximum force, $\varepsilon_{uk}$ (%) | | ≥ 5,0 | ≥ 7,5 |
| Bendability | | Bend / Rebend test | |
| Maximum deviation from nominal mass (individual bar) (%) | Nominal bar size (mm)<br>≤ 8<br>> 8 | <br>± 6,0<br>± 4,5 | |
| Bond:<br>Minimum relative rib area, $f_{R,min}$ | Nominal bar size (mm)<br>8 to 12<br>> 12 | <br>0,040<br>0,056 | |

## Setting details

For detailed information on installation see instruction for use given with the package of the product.

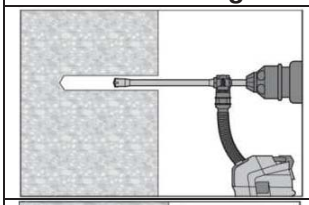
## Working time, curing time[a)]

| **Temperature of the base material** | **HIT-HY 200-R** | |
|---|---|---|
| | **Working time in which anchor can be inserted and adjusted $t_{work}$** | **Curing time before anchor can be fully loaded $t_{cure}$** |
| -10 ℃ to -5 ℃ | 3 hour | 20 hour |
| -4 ℃ to 0 ℃ | 2 hour | 7 hour |
| 1 ℃ to 5 ℃ | 1 hour | 3 hour |
| 6 ℃ to 10 ℃ | 40 min | 2 hour |
| 11 ℃ to 20 ℃ | 15 min | 1 hour |
| 21 ℃ to 30 ℃ | 9 min | 1 hour |
| 31 ℃ to 40 ℃ | 6 min | 1 hour |

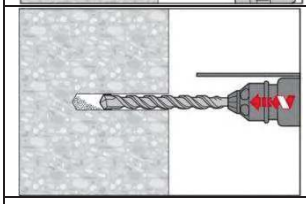
| **Temperature of the base material** | **HIT-HY 200-A** | |
|---|---|---|
| | **Working time in which anchor can be inserted and adjusted $t_{work}$** | **Curing time before anchor can be fully loaded $t_{cure}$** |
| -10 ℃ to -5 ℃ | 1,5 hour | 7 hour |
| -4 ℃ to 0 ℃ | 50 min | 4 hour |
| 1 ℃ to 5 ℃ | 25 min | 2 hour |
| 6 ℃ to 10 ℃ | 15 min | 1 hour |
| 11 ℃ to 20 ℃ | 7 min | 30 min |
| 21 ℃ to 30 ℃ | 4 min | 30 min |
| 31 ℃ to 40 ℃ | 3 min | 30 min |

**a) Dry and water-saturated concrete, hammer drilling**

**Bore hole drilling**



Drill hole to the required embedment depth with an appropriately sized Hilti TE-CD or TE-YD hollow drill bit with Hilti vacuum attachment. This drilling method properly cleans the borehole and removes dust while drilling. After drilling is complete, proceed to the “injection preparation” step in the instructions for use.

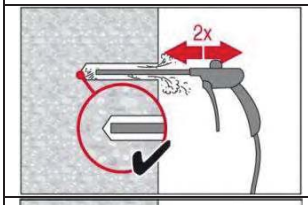


Drill hole to the required embedment depth using a hammer-drill with carbide drill bit set in rotation hammer mode, a Hilti hollow drill bit or a compressed air drill.

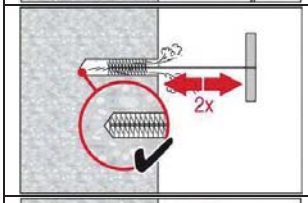
**Bore hole cleaning** Just before setting an anchor, the bore hole must be free of dust and debris by one of two cleaning methods described below

**b) Compressed air cleaning (CAC)**

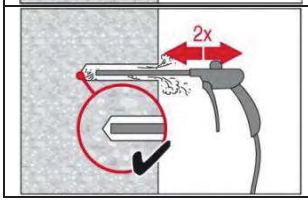
For all bore hole diameters $d_0$ and all bore hole depth $h_0$




Blowing 2 times from the back of the hole with oil-free compressed air (min. 6 bar at 100 litres per minute (LPM)) until return air stream is free of noticeable dust. Bore hole diameter ≥ 32 mm the compressor must supply a minimum air flow of 140 m³/hour.
If required use additional accessories and extensions for air nozzle and brush to reach back of hole.

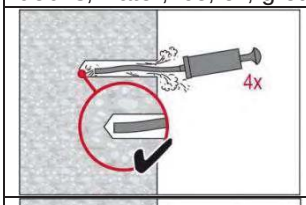



Brushing 2 times with the specified brush size (brush Ø ≥ borehole Ø) by inserting the round steel brush to the back of the hole in a twisting motion. The brush shall produce natural resistance as it enters the anchor hole. If this is not the case, please use a new brush or a brush with a larger diameter.

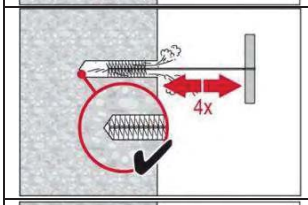



Blowing 2 times again with compressed air until return air stream is free of noticeable dust.

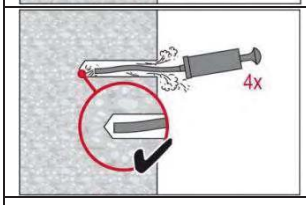
**a) Manual Cleaning (MC)**
As an alternative to compressed air cleaning, a manual cleaning is permitted for hammer drilled boreholes up to hole diameters $d_0 \leq 20$mm and depths $\ell_v$ resp. $\ell_{e,ges.} \leq 160$mm or 10 * d. The borehole must be free of dust, debris, water, ice, oil, grease and other contaminants prior to mortar injection.




4 strokes with Hilti blow-out pump from the back of the hole until return air stream is free of noticeable dust.

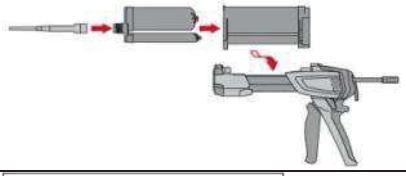



4 times with the specified brush size (brush Ø ≥ borehole Ø) by inserting the round steel wire brush to the back of the hole with a twisting motion

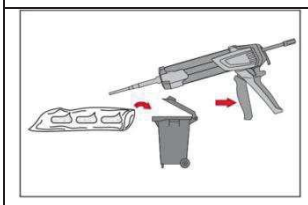



4 strokes with Hilti blow-out pump from the back of the hole until return air stream is free of noticeable dust.

**Injection preparation**

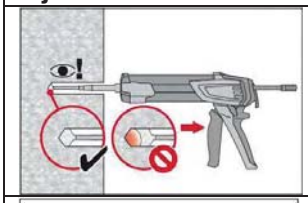


Observe the Instruction for Use of the dispenser.
Observe the Instruction for Use of the mortar.
Tightly attach Hilti HIT-RE-M mixing nozzle to foil pack manifold.
Insert foil pack into foil pack holder and swing holder into the dispenser.

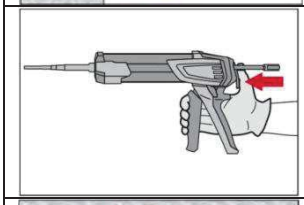


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded.
Discard quantities are
2 strokes for 330 ml foil pack,
3 strokes for 500 ml foil pack,
4 strokes for 500 ml foil pack ≤ 5°C.

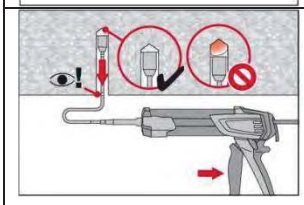
**Inject adhesive** from the back of the borehole without forming air voids



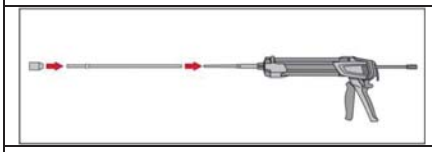
**Injection method for borehole depth ≤ 250 mm:**
Inject the mortar from the back of the hole towards the front and slowly withdraw the mixing nozzle step by step after each trigger pull. **Important! Use extensions for deep holes ( > 250 mm)**. Fill holes approximately 2/3 full, or as required to ensure that the annular gap between the rebar and the concrete is completely filled with adhesive over the embedment length.



After injecting, depressurize the dispenser by pressing the release trigger (only for manual dispenser). This will prevent further mortar discharge from the mixing nozzle.



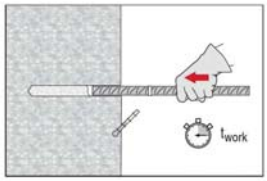
**Piston plug injection for borehole depth > 250 mm or overhead applications:** Assemble mixing nozzle, extension(s) and appropriately sized piston plug. Insert piston plug to back of the hole. Begin injection allowing the pressure of the injected adhesive mortar to push the piston plug towards the front of the hole. After injecting, depressurize the dispenser by pressing the release trigger. This will prevent further mortar discharge from the mixing nozzle.
The proper injection of mortar using a piston plug HIT-SZ prevents the creation of air voids. The piston plug must be insertable to the back of the borehole without resistance. During injection the piston plug will be pressed towards the front of the borehole slowly by mortar pressure. Attention! Pulling the injection or when changing the foil pack, the piston plug is rendered inactive and air voids may occur.



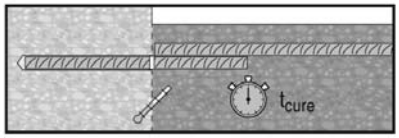
**HDM 330** Manual dispenser (330 ml)

**HDM 500** Manual dispenser (330 / 500 ml)
**HDE 500-A22** Electric dispenser (330 / 500 ml)

**Setting the element**




Before use, verify that the element is dry and free of oil and other contaminants.
Mark and set element to the required embedment depth until working time $t_{work}$ has elapsed.

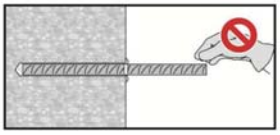



After installing the rebar the annular gap must be completely filled with mortar.

Proper installation can be verified when:

Desired anchoring embedment is reached $\ell_v$:
Embedment mark at concrete surface.
Excess mortar flows out of the borehole after the rebar has been fully inserted until the embedment mark.

Overhead application: Support the rebar and secure it from falling till mortar started to harden.



Observe the working time "$t_{work}$", which varies according to temperature of base material. Minor adjustments to the rebar position may be performed during the working time. After $t_{cure}$ preparation work may continue.

For detailed information on installation see instruction for use given with the package of the product.

## Resistance to chemical substances

| Chemical | Resistance | | Chemical | Resistance |
|---|---|---|---|---|
| Air | + | | Gasoline | + |
| Acetic acid 10% | + | | Glycole | o |
| Acetone | o | | Hydrogen peroxide 10% | o |
| Ammonia 5% | + | | Lactic acid 10% | + |
| Benzyl alcohol | - | | Maschinery oil | + |
| Chloric acid 10% | o | | Methylethylketon | o |
| Chlorinated lime 10% | + | | Nitric acid 10% | o |
| Citric acid 10% | + | | Phosphoric acid 10% | + |
| Concrete plasticizer | + | | Potassium Hydroxide pH 13,2 | + |
| De-icing salt (Calcium chloride) | + | | Sea water | + |
| Demineralized water | + | | Sewage sludge | + |
| Diesel fuel | + | | Sodium carbonate 10% | + |
| Drilling dust suspension pH 13,2 | + | | Sodium hypochlorite 2% | + |
| Ethanol 96% | - | | Sulfuric acid 10% | + |
| Ethylacetate | - | | Sulfuric acid 30% | + |
| Formic acid 10% | + | | Toluene | o |
| Formwork oil | + | | Xylene | o |

**+** resistant
**o** resistant in short term (max. 48h) contact
**-** not resistant

### Electrical Conductivity

HIT-HY 200 in the hardened state **is not conductive electrically**. Its electric resistivity is $15{,}5 \cdot 10^9\ \Omega \cdot cm$ (DIN IEC 93 – 12.93). It is adapted well to realize electrically insulating anchorings (ex: railway applications, subway).

## Drilling diameters

| Rebar (mm) | Drill bit diameters $d_0$ [mm] | |
|---|---|---|
| | Hammer drill (HD) | Compressed air drill (CA) |
| **8** | 12 (10 a)) | - |
| **10** | 14 (12 a)) | - |
| **12** | 16 (14 a)) | 17 |
| **14** | 18 | 17 |
| **16** | 20 | 20 |
| **18** | 22 | 22 |
| **20** | 25 | 26 |
| **22** | 28 | 28 |
| **24** | 32 | 32 |
| **25** | 32 | 32 |
| **26** | 35 | 35 |
| **28** | 35 | 35 |
| **30** | 37 | 35 |
| **32** | 40 | 40 |

a) Max. installation length l = 250 mm.

### Basic design data for rebar design according to ETA

## Bond strength

**Bond strength in N/mm² according to ETA for good bond conditions**

| Rebar (mm) | Concrete class | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | C12/15 | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
| **8 - 32** | 1,6 | 2,0 | 2,3 | 2,7 | 3,0 | 3,4 | 3,7 | 4,0 | 4,3 |

## Minimum anchorage length

### Minimum and maximum embedment depths and lap lengths for C20/25 according to ETA

| Rebar | | $l_{b,min}$* [mm] | $l_{0,min}$ * [mm] | Concrete temp. ≥ -10℃ $l_{max}$ [mm] | Concrete temp. ≥ 0℃ $l_{max}$ [mm] |
|---|---|---|---|---|---|
| Diameter $d_s$ [mm] | $f_{y,k}$ [N/mm²] | | | | |
| **8** | 500 | 113 | 200 | 700 | 1000 |
| **10** | 500 | 142 | 200 | 700 | 1000 |
| **12** | 500 | 170 | 200 | 700 | 1000 |
| **14** | 500 | 198 | 210 | 700 | 1000 |
| **16** | 500 | 227 | 240 | 700 | 1000 |
| **18** | 500 | 255 | 270 | 700 | 1000 |
| **20** | 500 | 284 | 300 | 700 | 1000 |
| **22** | 500 | 312 | 330 | 700 | 1000 |
| **24** | 500 | 340 | 360 | 700 | 1000 |
| **25** | 500 | 354 | 375 | 700 | 1000 |
| **26** | 500 | 369 | 390 | 700 | 1000 |
| **28** | 500 | 397 | 420 | 700 | 1000 |
| **30** | 500 | 425 | 450 | 700 | 1000 |
| **32** | 500 | 454 | 480 | 700 | 1000 |

* $l_{b,min}$ (8.6) and $l_{0,min}$ (8.11) are calculated for good bond conditions with maximum utilisation of rebar yield strength $f_{yk}$ = 500 N/mm² and $\alpha_6$ = 1,0